Patent Claims:

1. A method for the computer-aided generation of prognoses for operative systems (37), for example for control processes and the like, on the basis of multidimensional data records describing the state of a system, product and/or process, and applying the SOM method in which an ordered grid of nodes (1) representing the data distribution is determined, characterized in that in order to take account of nonlinearities in the data an internal scaling (σ_j) of variables (x_j) is undertaken on the basis of the nonlinear influence of each variable on the prognosis variable (y), in that local receptive regions assigned to the nodes (1) are determined on the basis of which local linear regressions are calculated, and in that optimized prognosis values for controlling the operative system (37) are calculated with the aid of the set of local prognosis models that is thus obtained, this being done by determining the respectively adequate node for each new data record and applying the local prognosis model to this data record.

2. The method as claimed in claim 1, characterized in that for each variable a dimension is formed for its order in the SOM representation and a measure is formed for its contribution to the explained variance, new internal scalings (σ_2) being determined from these dimensions on the basis that the estimated change (ψ) in the explained variance is maximized by varying the internal scalings, as a result of which the variables are ordered in the resulting SOM representation in accordance with their contributions to the explained variance and so the existing nonlinearities are more accurately resolved.

3. The method as claimed in claim 1 or 2, characterized in that when the receptive regions (r)

assigned to the nodes (1) are being determined, their magnitude is respectively selected to be so large that the explained variance of the local regression is maximal in conjunction with simultaneous safeguarding of significance and stability in the region of the node.

4. The method as claimed in claim 3, characterized in that when the receptive regions (r) assigned to the nodes (1) are being determined, it is in each case the smallest necessary receptive region that is selected for the significance of the regression, and the largest possible receptive region that is selected for maximizing the accuracy of prognosis.

5. The method as claimed in one of claims 1 to 4, characterized in that the internal scaling is carried out iteratively.

6. The method as claimed in one of claims 1 to 5, characterized in that the supplied data are subjected in advance to a compensating scaling (Π_j^{comp}) in order at least partially to compensate any possible correlations between variables (j).

7. The method as claimed in claim 6, characterized in that the individual data records are rescaled for the purpose of the compensating scaling, the values of a respective variable of all the data records being standardized, after which the data are transformed into the principal component space and the compensating scalings of the individual variables are calculated on the basis that the distance measure in the original variable space differs minimally from the distance measure in the standardized principal component space.

8. The method as claimed in claim 6 or 7, characterized in that the compensating scaling is

multiplicatively combined with the internal scaling, which takes account of the nonlinearities in the data, in order to form a combined variable scaling on which an SOM representation modified in accordance therewith is based.

9. A system for the generation of prognoses for operative systems, for example for control processes, on the basis of multidimensional data records describing a state of a system, product and/or process, having a database (1) for storing the data records, and having an SOM unit (2) for determining an ordered grid of nodes representing the data distribution, characterized in that the SOM unit (2) is assigned a nonlinearity feedback unit (4), set up for the internal scaling of variables in order to compensate their nonlinear influence on the prognosis variable, and also a calculation unit (5) set up for determining local linear regressions on the basis of local receptive regions assigned to the nodes, there further being provided a prediction unit (3) that is set up to use the local prognosis models thus obtained as a basis for calculating optimized prognosis values by determining the respectively adequate node for each new data record and applying the local prognosis model to this data record.

10. The system as claimed in claim 9, characterized in that a number of control units (30.1…30.n) assigned to individual process states are connected to the prediction unit (3) and are set up to predict the process results that would arise from the current process data.

11. The system as claimed in claim 10, characterized in that connected to the control units (30.1…30.n) are respectively separately assigned process units (31.1…31.n) that are set up to derive control

parameters on the basis of the predicted process results and of the desired values for the process respectively to be carried out in the operative system.